

Internet of Things: A Review

Manveer Joshi
Chandigarh Engineering College
Landran, Mohali, India
joshi.manvir@gmail.com

Dr. Bikram Pal Kaur
Chandigarh Engineering College
Landran, Mohali, India
mca.bikrampal@gmail.com

Abstract- This paper introduces the Internet of things, also known as network of object. This paper surveys basic idea, context and special challenges of it.

Keywords: IOT, RFID

Introduction:

Internet of things is a collection of intelligent objects around us as shown in Figure 1 [1]. These connected objects communicate with one other for example actuators, sensors, etc. The main idea behind IoT is to employ the smart networked devices, smart objects and smart applications in information, business and social processes. This is the evolving idea to make self-aware environments. Examples are smart transport, health, cities, buildings, rural areas, energy, living, food, energy, digital society and climate estimation.

First objective of IoT is to make things smart. A common household task washing clothes is easy to perform now with the smart washing machines. These digital

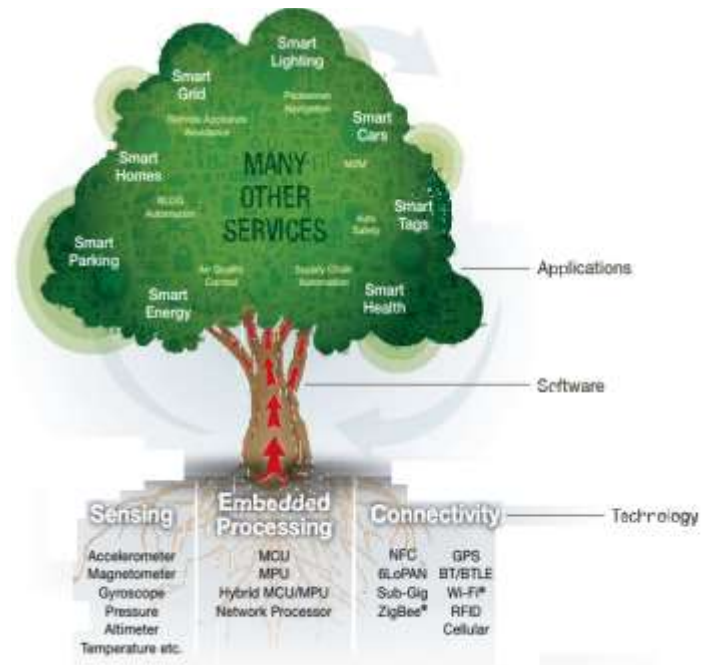


Figure 1: The IOT

washing machine has embedded microprocessor for command and control.

Now, second innovative step involves making the smart devices connect and communicate. For example controlling the power system of our home by connecting switch board with laptop in an office via Internet.[2], [3]

Third and ultimate goal is to automate working of devices based on configured settings so that tasks may be performed without human intervention

IOT Framework

IoT is becoming the fundamental part of the future internet and it consists of IoT (Internet of Things), IoM (Internet of Multimedia), IoS (Internet of services), and IoE (Internet of Energy) Figure 2 [4]

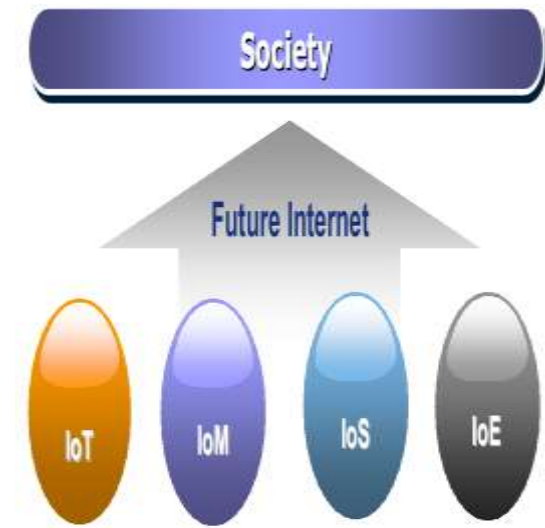


Figure 2: IOT Framework

IoT

Internet of Things (IoT) is a base of Future Internet for connecting 4A's: Anyone, Anything, Anytime, Anywhere. It is smart global network with self configuring capabilities using some standard techniques and special protocols and smart interfaces to form an information network for supporting our house hold activities to develop large business applications.

IoM

IoM addresses the challenges in streaming multimedia data over internet for example

scalable video coding and heavy multiplayer mobile games 3D video processing, digital TV, dynamically adapting to the network, mobile computing, etc.

IoS

IoS represents all the software based component that are needed for IoT based networking, Like Web/enterprise, Protocols for constrained networks, Research on SOA, 3.0/X.0, service and semantic Web, grid services for improving interaction between server and client

IoE

IoE deals with connecting the energy network over Internet providing units of energy which is generated locally and then stored, and forwarded to the place where it is needed.

IoT Use Cases

The main idea of IoT is to create smart environments, spaces and things, some of its main application being developed are:

1. Environmental Monitoring

Environmental monitoring applications make use of sensors to assist in saving environment from any unwanted hazards by assessing atmospheric conditions and to monitor soil, air, water quality, and wildlife. Also it includes pre warning natural hazards (earthquake or tsunami) so that remedial action can be taken prior to the damage.

2. Infrastructure Management

Assessing, commanding and controlling tasks of both metropolitan and rustic infrastructures like railway tracks, bridges, wind-farms are the basic applications of the IoT. These applications can be used to monitor the changes in the physical structure to avoid any breakage risks. And these are used to perform repair and maintenance tasks fast and effectively with better quality of service and reduced cost of utilizing.

3. Medical and Healthcare Systems

IoT resources like sensors it is easy to examine the health of the patients. They need not to sit one place. Their movement and health can be tracked from distant place. They are free to roam in parks, canteens or in other living spaces, etc. There are already developed equipments like blood pressure and heart rate monitors which are capable of monitoring implanted pacemakers and hearing aids.

4. Industrial Applications

IoT application is also working in industries to manufacture, operate and maintain equipments. The IoT smart systems allow the speedy manufacturing of new equipments or products, and optimization of production processes and to synchronize demand and chain tasks using networked machinery, sensors based control systems,

intelligent industrial management systems in conjunction with the smart grid, for better energy utilization. Automated production plant, life safety management functions are provided by IoT devices networked sensors.

5. Energy Management

Now comes energy management, In near future many of IoT devices sensors and actuators, will be connected to the Internet, so it is obvious they will consume plenty of energy optimize energy consumption as a whole. So it is very important to control power generation and consumption. IoT devices, Protocols, Equipments are designed in keeping view energy constraints.

6. Transport Systems

The IoT enabled and information processing across various transportation systems. They are able to communicate over a distance. Passengers are benefitted from IoT Applications they are able to track the bus movements. Smart parking systems are developed in some countries where car parking is done by the sensor based parking system.

7. Building and Home Automation

This is the very innovative idea to make life easier. Electrification of all the mechanical, electrical and electronic equipments for private and public use is being

practiced. Home automation systems, and other building air conditioning appliances to control lighting, temperature.

8. Large Scale Deployments

There are several ongoing and planned large-scale deployments of the IoT for the effective management of cities and Machines [5], [6]. For example, Songdo, the first fully equipped and wired smart city South Korea. Almost everything in this city is automated. Another example of large-scale deployments is the Sino-Singapore Guangzhou Knowledge City. This city work on air and water quality improvement, reducing noise pollution. Smart traffic controlling systems in western Singapore is another example of a large deployment. Also in India Projects are under way to make Gujarat a smart city.

Special Challenges of IoT

Energy is a bigger issue for IoT world. As the IoT resources like sensors cannot stay up for longer hours [7]. So it is necessary for the developers either to optimize their codes or to use special protocols, which are specially designed for the constrained networks. For example MQDBB or CoAP, etc.

Intelligence

It is very necessary for the IoT devices to be very efficient for security, operability in

harsh conditions, memory management and mobile environment. Due to energy constraints IoT devices cannot work on complex codes. Their codes must be optimized and efficient.

Amalgamation and standardization

IoT devices must address the issues like cost, Quality of Service (QoS) and adaptability. The ability to sense and act for the unification of fast technologies like Radio Frequency Identification (RFID) [8], [9], smart antennas (adaptive, fractal, receptive directional and plasma) advanced communication system chips is needed. Networks must be equipped with smart technologies. Unification of advanced tool is need for better servicing business needs [10], [11], [12]. Due to diverse nature of technology there must be adoption of some standard set of equipments to enable interoperability. Strategies of reforming and recycling must be adopted.

Conclusion

IoT is growing day by day. Today many IoT projects are in planning phase while some in execution phase. The technologists have many challenges ahead. Soon IoT is going to become reality.

References

[1] INTOTHNGSWP REV 2, "What the Internet of Things (IoT) Needs to Become a

Reality,” White Paper, Global Strategy and Business Development, Freescale and Emerging Technologies, ARM, May 2014

[2] ITU Internet Reports, the Internet of Things, November 2005.

[3] Internet 3.0: The Internet of Things. Analysys Mason Limited 2010.

[4] M Maher, “Smart Spaces: A Practical Approach,” El Iman DataSense

[5] J. Stankovic, “A vision of a smart city in the future,” Smart Cities, vol. 1, no. 10, Oct. 2013.

[6] A. Zanella, L. Vangelista, “Internet of Things for Smart Cities,” IEEE Internet of things journal, vol. 1, no. 1, Feb 2014

[7] Vision and Challenges for Realising the Internet of Things, European Union 2010, ISBN 9789279150883.

[8] S. Amendola, R. Lodato, S. Manzari, C. Occhiuzzi, and G. Marrocco, “RFID Technology for IoT Based Personal Healthcare in Smart Spaces,” IEEE Internet of things journal, vol. 1, no. 2, April 2014

[9] M. S. Khan, M. S. Islam, “Design of a Reconfigurable RFID Sensing Tag as a Generic Sensing Platform Toward the

Future Internet of Things,” IEEE Internet of things journal, vol. 1, no. 4, Aug 2014

[10] A Digital Agenda for Europe, COM (2010) 245, Chapter 2.5.3. Industry led initiatives for open innovation.

[11] Extracting Value From the Massively Connected World of 2015, Online: www.gartner.com/DisplayDocument?id=476440.

[12] D. Evans, “The Internet of Things How the Next Evolution of the Internet is changing everything,” Cisco IBSG, April 2011